UNIVERSITI TEKNOLOGI MARA

SYMPODIAL ORCHID WATER STRESS DETECTION VIA STEM

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MSc

May 2014

AUTHOR'S DECLARATION

I declare that the works in this thesis were carried out in accordance with the regulations of Universiti Teknologi MARA. It is original and is the results of my own works, unless otherwise indicated or acknowledged as reference work. This thesis has not been submitted to any other institution or non-academic institution for any other degree or qualification.

I, hereby, acknowledge that I have been supplied with the Academic Rules and Regulations for Post Graduate, Universiti Teknologi MARA, regulating the conduct of my study and research.

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ABSTRACT

The measurements of stems play an important indicator for plants' water status. Many researches have been done in terrestrial plants to investigate the stems' variation responses that inspired to develop a precise irrigation system. Hence, the works presented in this thesis were the investigations of the stems' variations in epiphyte plants which were sympodial orchids using PIC based instrumentation sensors. A strain gauge was used as a sensor to measure the orchid's stem variation for a duration of 25th October 2012 until 27th November 2012 and from the 3rd December 2012 until 19th December 2012. The other sensors were used for humidity, temperature and light measurement integrated with PIC instrumentation circuit. The Dendrobium orchid that grew from tissue culture was chosen as a sampling plant due to its popularity and demand as a cut flower in the world. Two experiments were executed within 30 days and 16 days respectively, which had involved 14 samples of orchid plants growing indoor and outdoor. The measurements were recorded every 15 minutes continuously along the experiments executed. The 2 mm aluminium strain gauge and it's signal conditioning that integrated with PIC produced a significant correlation at 0.99 between its output and the changes in displacement. The results showed that the proposed instrumentation was capable to detect the stem's diameter changes and those studies have had significant impacts for triggering further researches in the developments of precise watering systems in orchid farms.

ACKNOWLEDGEMENTS

All praises to the Almighty Allah, for giving me the strength, patience and guidance for the process of completing this research study. I am grateful to have the support and motivation from many people throughout completing this study and I would love to take this opportunity to thank those who are either directly or indirectly involved during the process of this study was conducted. My deepest thanks go to my supervisor who had shepherded me through her guidance and recommendations of the work, Prof. Datin Ir. Dr. Shah Rizam binti Mohd Shah Baki. Her kind but rigorous oversight of this thesis constantly gave me the motivation to perform to my maximum abilities. I was very fortunate to have been able to work with her and had her great knowledge and experience shared.

Besides, I must also thank to Prof Madya Dr Nooritawati Md Tahir for her cooperation and precious advice in order to give the specific guideline for me to finish this research. Her detailed and constructive comments were vital to the developments of this thesis. I would like to extend my appreciation to the staffs of Faculty of Electrical Engineering, University Technology MARA, Shah Alam for their cooperation and help throughout the entire duration of the study.

Further appreciation is a must to Ministry of Higher Education, Malaysia for an awarded of the FRGS Grant, No: FRGS/2/2010/STWN/UITM/03/12, to Puan Naimah Binti Mat Isa and her team that gave me the best opportunity to pursue my research study as one of their output from the awarded grant.

Last but not least, I would like to take this opportunity to thank my beloved family members who had never failed to be there for their loves, supports and prayers. Not forgotten to all my friends, especially my classmates for their tremendous encouragement, support and patience.

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